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HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2014

MATHEMATICS Compulsory Part
PAPER 2

11.30 am – 12.45 pm (1¼ hours)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

2. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

Not to be taken away before the end of the examination session

There are 30 questions in Section A and 15 questions in Section B.
The diagrams in this paper are not necessarily drawn to scale.
Choose the best answer for each question.

Section A

1. $(2n^3)^{-5} =$

   A. $\frac{1}{32n^2}$.

   B. $\frac{1}{32n^{15}}$.

   C. $\frac{1}{10n^{125}}$.

   D. $\frac{1}{10n^{243}}$.

2. $u^2 - v^2 - 5u + 5v =$

   A. $(u-v)(u+v-5)$.

   B. $(u-v)(u+v+5)$.

   C. $(u+v)(u-v-5)$.

   D. $(u+v)(u-v+5)$.

3. If p and q are constants such that $px(x-1)+x^2 \equiv qx(x-2)+4x$, then $p =$

   A. 1 .

   B. 2 .

   C. 3 .

   D. 4 .

4. Let a be a constant. If the quadratic equation $x^2+ax+a=1$ has equal roots, then $a=$

A. -1 .

B. 2 .

C. 0 or -4 .

D. 0 or 4 .

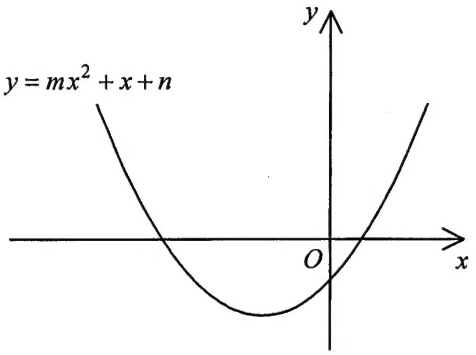
5. The figure shows the graph of $y=mx^2+x+n$, where m and n are constants. Which of the following is true?

A. $m<0$ and $n<0$

B. $m<0$ and $n>0$

C. $m>0$ and $n<0$

D. $m>0$ and $n>0$



6. If $a>b$ and $k<0$, which of the following must be true?

I. $a^2>b^2$

II. $a+k>b+k$

III. $\frac{a}{k^2}>\frac{b}{k^2}$

A. I only

B. II only

C. I and III only

D. II and III only

7. The solution of $-3x<6<2x$ is

A. $x>-2$.

B. $x>0$.

C. $x>3$.

D. $-2<x<3$.

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8. The price of 2 bowls and 3 cups is \$506 . If the price of 5 bowls and the price of 4 cups are the same, then the price of a bowl is

A. \$88 .

B. \$92 .

C. \$110 .

D. \$115 .

9. There are 792 workers in a factory. If the number of male workers is 20% less than that of female workers, then the number of male workers is

A. 352 .

B. 360 .

C. 432 .

D. 440 .

10. If the angle and the radius of a sector are decreased by $x\%$ and 50% respectively so that its area is decreased by 90% , then $x =$

A. 20 .

B. 40 .

C. 60 .

D. 80 .

11. The width and the length of a thin rectangular metal sheet are measured as 8 cm and 10 cm correct to the nearest cm respectively. Let x cm^2 be the actual area of the metal sheet. Find the range of values of x .

A. $71.25 \leq x < 89.25$

B. $71.25 < x \leq 89.25$

C. $79.5 \leq x < 80.5$

D. $79.5 < x \leq 80.5$

12. It is given that $\frac{4}{5a}=\frac{5}{7b}=\frac{7}{9c}$, where a, b and c are positive numbers. Which of the following is true?

A. $a<b<c$

B. $a<c<b$

C. $b<a<c$

D. $b<c<a$

13. If z varies inversely as x and directly as the cube of y, which of the following must be constant?

A. xy^3z

B. x^3yz^3

C. $\frac{y^3}{xz}$

D. $\frac{y}{x^3z^3}$

14. Let a_n be the nth term of a sequence. If $a_2=7$, $a_4=63$ and $a_{n+2}=a_{n+1}+a_n$ for any positive integer n, then $a_5=$

A. 56.

B. 70.

C. 91.

D. 119.

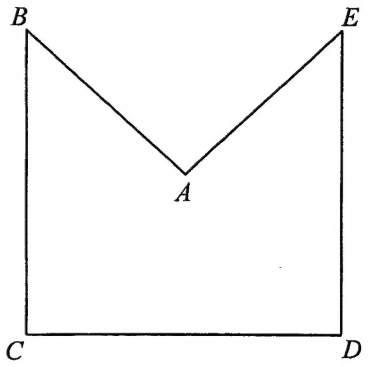
15. In the figure, $AB=AE$ and $\angle BAE=\angle BCD=\angle CDE=90°$. If $BC=CD=DE=16$ cm, then the area of the pentagon $ABCDE$ is

A. 71 cm^2.

B. 128 cm^2.

C. 192 cm^2.

D. 224 cm^2.



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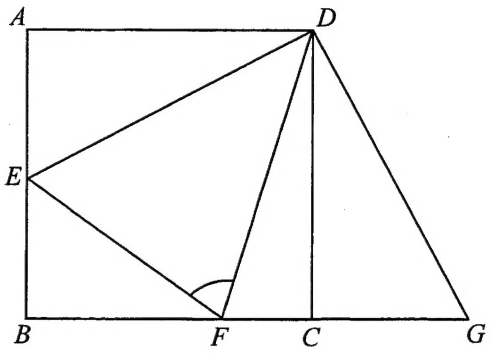
16. In the figure, $ABCD$ is a square. BC is produced to G such that $\angle CDG = 25°$. E is a point lying on AB such that $AE = CG$. If F is a point lying on BC such that $\angle CDF = 20°$, then $\angle DFE =$

A. $60°$.

B. $65°$.

C. $70°$.

D. $73°$.



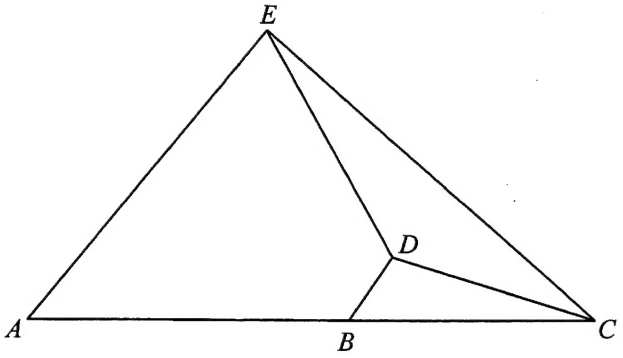
17. In the figure, B is a point lying on AC such that $AB : BC = 3 : 2$. It is given that $AE // BD$. If the area of ΔBCD and the area of ΔCDE are $4\,\text{cm}^2$ and $8\,\text{cm}^2$ respectively, then the area of the trapezium $ABDE$ is

A. $18\,\text{cm}^2$.

B. $21\,\text{cm}^2$.

C. $27\,\text{cm}^2$.

D. $33\,\text{cm}^2$.



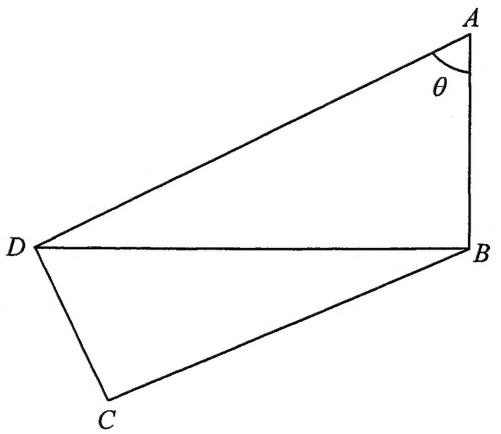
18. In the figure, $\angle ABD = \angle ADC = \angle BCD = 90°$. If $AB = \ell$, then $CD =$

A. $\ell \sin\theta$.

B. $\ell \cos\theta$.

C. $\ell \sin\theta \tan\theta$.

D. $\dfrac{\ell \tan\theta}{\cos\theta}$.



19. $(\cos(90°+\theta)+1)(\sin(360°-\theta)-1)=$

A. $-\cos^2\theta$.

B. $-\sin^2\theta$.

C. $\cos^2\theta$.

D. $\sin^2\theta$.

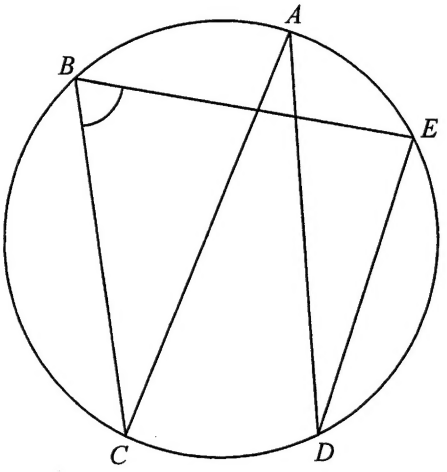
20. In the figure, AC is a diameter of the circle $ABCDE$. If $\angle ADE = 28°$, then $\angle CBE =$

A. $56°$.

B. $62°$.

C. $72°$.

D. $76°$.



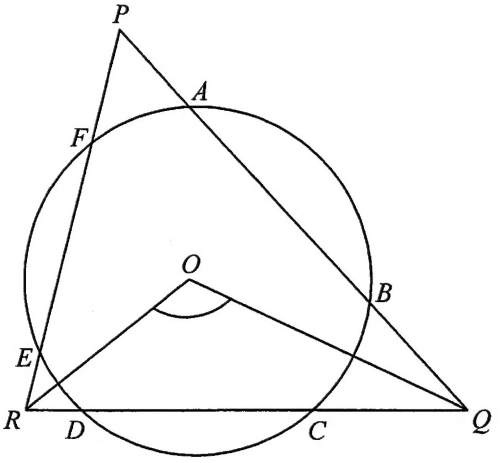
21. In the figure, O is the centre of the circle $ABCDEF$. ΔPQR intersects the circle at A, B, C, D, E and F. If $\angle QPR = 38°$ and $AB = CD = EF$, then $\angle QOR =$

A. $109°$.

B. $117°$.

C. $123°$.

D. $142°$.



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22. If an interior angle of a regular n-sided polygon is greater than an exterior angle by $100°$, which of the following are true?

I. The value of n is 10.
II. Each exterior angle of the polygon is $40°$.
III. The number of axes of reflectional symmetry of the polygon is 9.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

23. The rectangular coordinates of the point P are $(-1, \sqrt{3})$. If P is reflected with respect to the x-axis, then the polar coordinates of its image are

A. $(2, 210°)$.

B. $(2, 240°)$.

C. $(4, 210°)$.

D. $(4, 240°)$.

24. The equations of the straight lines L_1 and L_2 are $2x + 3y = 5$ and $4x + 6y = 7$ respectively. If P is a moving point in the rectangular coordinate plane such that the perpendicular distance from P to L_1 is equal to the perpendicular distance from P to L_2, then the locus of P is a

A. circle.

B. square.

C. parabola.

D. straight line.

25. In the figure, the two straight lines intersect at a point on the positive y-axis. Which of the following are true?

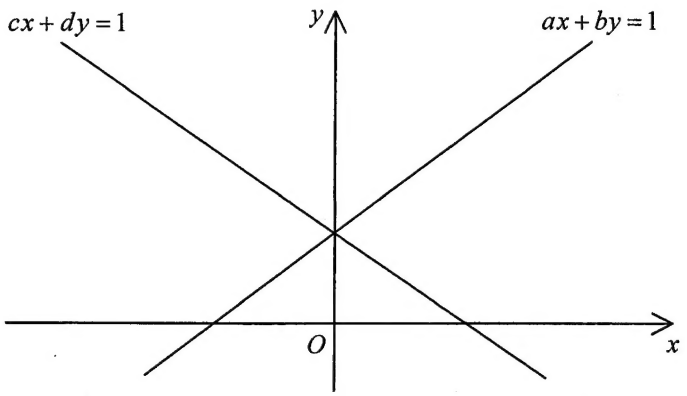
I. $a<0$
II. $c>0$
III. $b=d$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III



26. If a diameter of the circle $x^2+y^2-8x+ky-214=0$ passes through the point $(6,-5)$ and the slope of the diameter is -4, then $k=$

A. -6.

B. -4.

C. 13.

D. 70.

27. A box contains m yellow balls and 20 black balls. If a ball is randomly drawn from the box, then the probability of drawing a yellow ball is $\frac{1}{m}$. Find the value of m.

A. 4

B. 5

C. 15

D. 25

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28. The mean height of 25 teachers and 140 students is 150 cm . If the mean height of the students is 145 cm , then the mean height of the teachers is

A. 151 cm .

B. 155 cm .

C. 176 cm .

D. 178 cm .

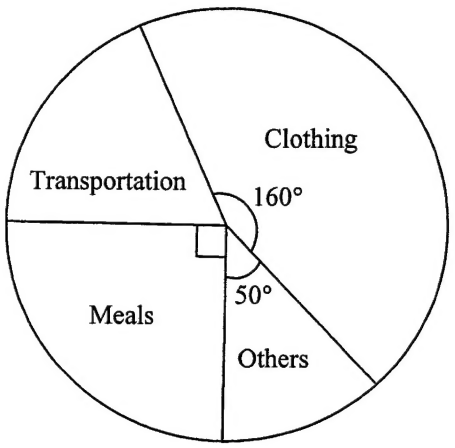
29. The pie chart below shows the expenditure of John in a certain week. John spends \$240 on clothing that week. Find his expenditure on transportation that week.

A. \$40

B. \$60

C. \$90

D. \$135



30. The stem-and-leaf diagram below shows the distribution of the ages of the passengers in a bus.

Stem (tens)	Leaf (units)						
1	h	4	6				
2	3	3	3	4	6	7	7
3	1	2	2	2	6	8	
4	0	k					

If the range of the above distribution is at least 33 , which of the following must be true?

I. $0 \le h \le 3$
II. $3 \le k \le 9$
III. $3 \le k - h \le 5$

A. I only

B. II only

C. I and III only

D. II and III only

Section B

31. The H.C.F. of $3x^4y^2z$, $4xy^5z$ and $6x^2y^3$ is

A. xy^2.

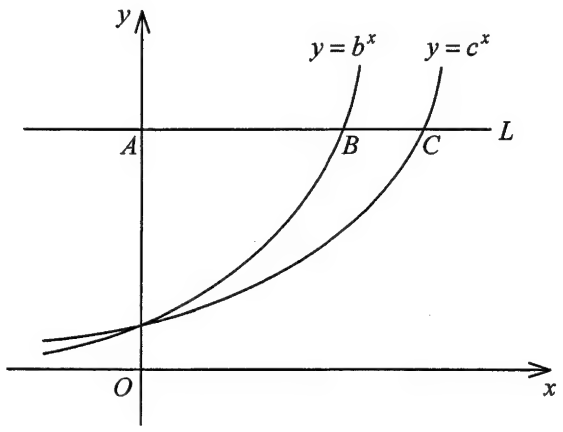
B. xy^2z.

C. $12x^4y^5z$.

D. $12x^7y^9z^2$.

32. The figure shows the graph of $y = b^x$ and the graph of $y = c^x$ on the same rectangular coordinate system, where b and c are positive constants. If a horizontal line L cuts the y-axis, the graph of $y = b^x$ and the graph of $y = c^x$ at A, B and C respectively, which of the following are true?

I. $b < c$
II. $bc > 1$
III. $\frac{AB}{AC} = \log_b c$



A. I and II only

B. I and III only

C. II and III only

D. I, II and III

33. Which of the following is the greatest?

A. 124^{241}

B. 241^{214}

C. 412^{142}

D. 421^{124}

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34. $7\times2^{10}+2^8+5\times2^3-2^3=$

A. 111010100000_2 .

B. 111100010000_2 .

C. 1110100100000_2 .

D. 1111000010000_2 .

35. Let $f(x)=3x^2-6x+k$, where k is a constant. If the y-coordinate of the vertex of the graph of $y=f(x)$ is 7 , then $k=$

A. 1 .

B. 3 .

C. 4 .

D. 10 .

36. If β is a real number, then $\dfrac{\beta^2+4}{\beta+2i}=$

A. $\beta-2i$.

B. $\beta+2i$.

C. $2-\beta i$.

D. $2+\beta i$.

37. If $m>1$, which of the following are geometric sequences?

I. 2^m , 2^{2m} , 2^{3m} , 2^{4m}

II. m , $2m^2$, $3m^4$, $4m^8$

III. $\log m$, $\log m^2$, $\log m^4$, $\log m^8$

A. I and II only

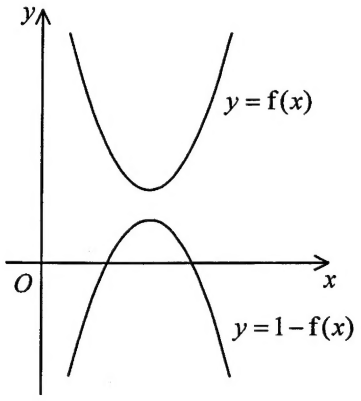
B. I and III only

C. II and III only

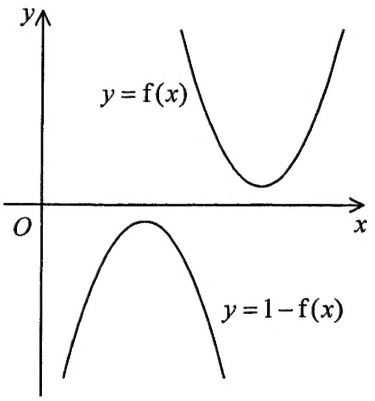
D. I , II and III

38. Which of the following may represent the graph of $y = f(x)$ and the graph of $y = 1 - f(x)$ on the same rectangular coordinate system?

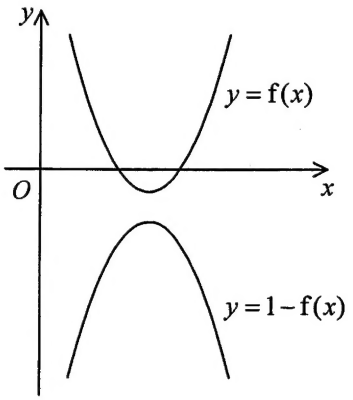
A.



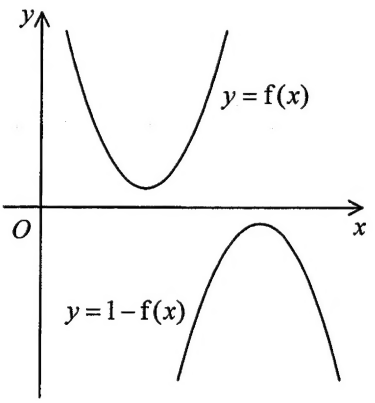
B.



C.



D.



39. For $0° \le x \le 360°$, how many roots does the equation $7\sin^2 x = \sin x$ have?

A. 2

B. 3

C. 4

D. 5

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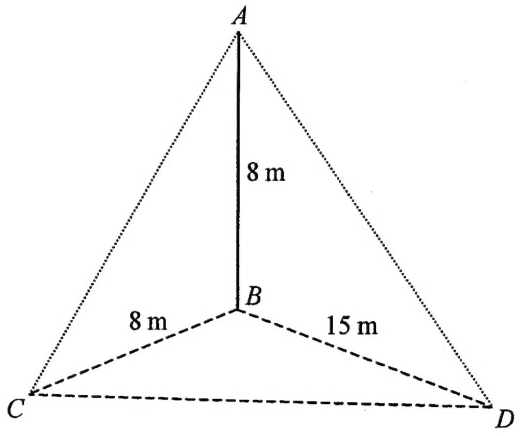
40. In the figure, AB is a vertical pole standing on the horizontal ground BCD, where $\angle CBD = 90°$. If the angle between the plane ACD and the horizontal ground is θ, then $\tan\theta =$

A. $\frac{8}{15}$.

B. $\frac{15}{8}$.

C. $\frac{15}{17}$.

D. $\frac{17}{15}$.



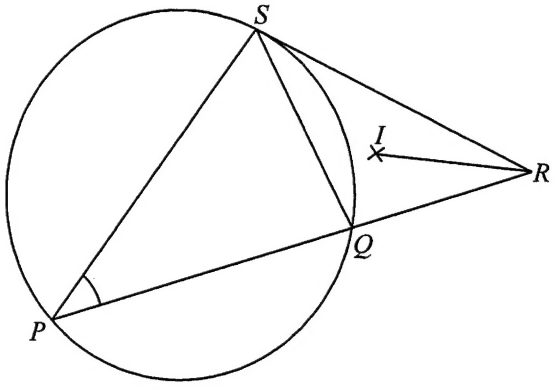
41. In the figure, PQS is a circle. PQ is produced to R such that RS is the tangent to the circle at S. I is the in-centre of ΔQRS. If $\angle IRQ = 12°$ and $\angle PSQ = 70°$, then $\angle QPS =$

A. $24°$.

B. $37°$.

C. $43°$.

D. $62°$.



42. If the straight line $x - y = k$ and the circle $x^2 + y^2 + 2x - 4y - 1 = 0$ intersect at A and B, then the x-coordinate of the mid-point of AB is

A. $1 + k$.

B. $1 - k$.

C. $\frac{1+k}{2}$.

D. $\frac{1-k}{2}$.

43. There are 13 boys and 17 girls in a class. If a team of 2 boys and 3 girls is selected from the class to participate in a voluntary service, how many different teams can be formed?

A. 38 896

B. 53 040

C. 142 506

D. 636 480

44. In an examination, Peter gets 55 marks and his standard score is -3 while Mary gets 95 marks and her standard score is 2. Find the mean of the examination scores.

A. 8 marks

B. 64 marks

C. 75 marks

D. 79 marks

45. If the variance of the four numbers a, b, c and d is 9, then the variance of the four numbers $14-a$, $14-b$, $14-c$ and $14-d$ is

A. 5.

B. 9.

C. 23.

D. 121.

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